BASEWIDE INSTALLATION RESTORATION SITE ECOLOGICAL RISK SCREENING FOOD WEB MODELING, NAVAL SUPPORT STATTION, MECHANICSBURG, PENNSYLVANIA.

NAVAL SUPPORT STATION MECHANICSBURG

The Naval Support Station Mechanicsburg (NSS) mission is to project requirements, procure materials, and direct materials distribution in support of repair and maintenance of ships' structural repair, electronic, navigational and weapons systems. The NSS is an 823-acre installation located in central Pennsylvania, west of Harrisburg and just northeast of the Borough of Mechanicsburg. Most of the installation is occupied by buildings, pavement, and railroad spurs. Approximately 20% of the installation (160 acres) consists of grassy open areas that are routinely mowed. The remaining space (115 acres) is unimproved grounds where maintenance is minimal. Land use surrounding the installation is residential, commercial, or light industrial.

The NSS Mechanicsburg was placed on the Superfund National Priorities List (NPL) on 31 May 1994. Fifteen Installation Restoration Sites (IR Sites) were identified and have been under investigation by the Navy.

ECOLOGICAL RISK ASSESSMENT INVESTIGATIONS

Draft Basewide Installation Restoration Site Ecological Risk Screening (BIRSERS)

The Navy's Installation Restoration Program (IR Program) has addressed the potential for ecological impacts at the NSS Mechanicsburg in the Draft Basewide Installation Restoration Site Ecological Risk Screening (BIRSERS) report issued in December 1997 (EA 1997a). The ecological risk assessment program for NSS is being conducted in accordance with *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (U.S. EPA 1997) and *Navy Policy for Conducting Ecological Risk Assessments* (U.S. Navy 1999). The scope of investigation for the BIRSERS was based on decisions reached with the U.S. EPA Region III, Biological Technical Assistance Group (BTAG), the Pennsylvania Department of Environmental Protection (PADEP), and Natural Resource Trustees.

The Draft BIRSERS included a screening level problem formulation and ecological effects evaluation of the ecological risk assessment components of Step 1 Ecological Screening in the U.S. EPA (1997) and in Step 1 of the Tier 1 Screening Risk Assessment described in the Navy guidance. The draft BIRSERS evaluation included:

- Evaluation of existing information
- Habitat characterization
- IR Program site screening
- Identification of potential ecological receptors of concern (ROC)
- Identification of preliminary assessment and measurement endpoints
- Conceptual site model (CSM) development

Food Web Modeling Technical Memorandum

In commenting on the Draft BIRSERS, U.S. EPA Region III and PADEP requested that food web modeling be performed for all identified analytes where the screening quotient was greater than 1. Step 2 of U.S. EPA (1997) describes a conservative screening assessment procedure for estimating exposure and calculating risk through food web modeling. The Navy developed a Work Plan Basewide Installation Restoration Site Ecological Risk Screening Food Web Modeling to execute the food web model consistent with Step 2 of the U.S. EPA Guidance.

Conservative Food Web Model

The primary objective of the conservative food web model was to provide the data necessary to further evaluate those areas of NSS where the ecological risk screening evaluation presented in the BIRSERS indicated that there is a potential for risk to ecological resources due to the IR sites. Conservative food web models developed for each of the areas of concern are summarized below.

On Base Sites 2,5, and 8 Each of these areas provides only terrestrial habitat of maintained herbaceous vegetation. The receptors of concern that are identified in the model are herbaceous mammals (vole and rabbit), omnivorous mammals (short-tailed shrew, white footed mouse) and a carnivorous mammal (red fox). Avian receptors of concern are an omnivorous bird (robin) and raptor (red tailed hawk).

Site 9 Stormwater Drainage Ditch (SWDD)   All three segments of the SWDD provide terrestrial habitat and the ROC described for the on base sites were also evaluated for the SWDD. The habitat on the SWDD includes well developed forest habitat. A smaller passerine receptor that is typical of forest dwelling birds was added (wren). In addition the proximity of Segment 3 to Trindle Spring Run results in forage area suitable for use by waterfowl (mallard) and smaller passerines (marsh wren).

Trindle Spring Run, Floodplain and Conodoguinet Creek   All of the above cited ROC were evaluated for these areas. In addition, receptors that require aquatic habitat were evaluated for Trindle Spring Run and Conodoguinet Creek. These are the turtle, mink and belted kingfisher.

Refinement of Conservative Assumptions

Where a potential for risk is identified by these Tier 1 conservative models, the food web model parameters are were reexamined, as described in Step 3a of the Tier 2 Baseline Ecological Risk Assessment Navy policy for ecological risk assessment. The food web model parameters were evaluated to determine whether application of more realistic assumptions would result in an indication of negligible risk. Factors considered in this refinement included: area use factor, bioavailability, life stage, body weight and food ingestion rates, dietary composition, contaminant distribution (background, detection frequency), and the uncertainty of the toxicity reference values (TRVs). The result of this refinement (Step 3a) was an identification of COPCs that should be further evaluated in a baseline ecological risk assesment.

On the basis of the Step 2 and 3a conservative food web models, background comparisons, and frequency of detection analysis, a revised COPC list has been developed. Those COPCs identified for further evaluation in a baseline ecological risk assessment are presented in Table 1.

Points of Contact:

Edward Boyle – Northern Division Naval Facilities Engineering Command
Diana McPherson Bartlett - Northern Division Naval Facilities Engineering Command

TABLE 1 REVISED COPC LIST WITH COPCS EXCLUDED FROM TIER 2, RATIONALE
FOR EXCLUSION, AND REVISED COPC FOR TIER 2

Site	COPCs Excluded from Tier 2	Rationale for Exclusion	Revised COPCs for Tier 2
Site 2 – Building 904 Landfill	Mercury, nickel, lead, manganese, zinc, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and fluoranthene	Step 2 - Food web modeling (mercury HQ = 0.66 and nickel HQ = 0.78), Step 3a-Background comparison (lead, manganese, zinc, benz(a) anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and fluoranthene)	Chromium, vanadium, benz phenanthrene, and pyrene
Site 5- Golf Course Landfill	Mercury, nickel, chromium, lead, manganese, vanadium, and zinc	Step 2 - Food web modeling (mercury HQ = 0.70 and nickel HQ = 0.75), Step 3a-Background comparison (chromium, lead, manganese, vanadium, and zinc)	Cadmium and Aroclor 1260
Site 8 – Ore Storage Piles	Barium, copper, lead, manganese, silver, vanadium, and zinc	Step 3a-Background comparison (barium, copper, lead, manganese, silver, vanadium, and zinc)	Cadmium, chromium, nicke benz(a)anthracene, benzo(a) benzo(g,h,i)perylene, benzo chrysene, fluoranthene, inde phenanthrene, and pyrene
Site 9, Segment 1 – Stormwater Drainage Ditch	Aroclor 1016, cadmium, manganese, selenium, vanadium, bis(2-Ethylhexyl)phthalate, di-n-octyl phthalate	Step 2 - Food web modeling (Aroclor 1016 HQ = 0.08), Step 3a background Comparison (cadmium, manganese, selenium, vanadium), Step3a Frequency of Detection Analysis (bis(2-Ethylhexyl)phthalate, Di-n-octyl phthalate)	Antimony, chromium, copp silver, zinc, Aroclor 1260, a acenaphthylene, anthracene, benzo(a)pyrene, benzo(b)flu benzo(g,h,i)perylene, benzo chrysene, fluoranthene, fluo cd)pyrene, naphthalene, phe pyrene
Site 9, Segment 2 – Stormwater Drainage Ditch	Nickel, manganese, 2-Methylnaphthalene	Step 2 - Food web modeling (Nickel HQ = 0.66), Step 3a-Background comparison	Arsenic, cadmium, chromiu mercury, selenium, silver, v Aroclor 1260, acenaphthene benz(a)anthracene, benzo(a)

Site	COPCs Excluded from Tier 2	Rationale for Exclusion	Revised COPCs for Tier 2
		(manganese), Step3a Frequency of Detection Analysis (2-Methylnaphthalene)	benzo(b)fluoranthene benzo benzo(k)fluoranthene, chrys fluorene, indeno(1,2,3-cd)py phenanthrene, and pyrene
Site 9, Segment 3 – Stormwater Drainage Ditch	Nickel, antimony, manganese	Step 2 - Food web modeling (nickel HQ = 0.65), Step 3a-Background comparison (antimony, manganese)	Arsenic, cadmium, chromiu mercury, silver, vanadium, z benzo(b)fluoranthene, chrys phenanthrene, and pyrene
Floodplain	Mercury, chromium, lead, manganese, vanadium, zinc	Step 2 - Food web modeling (mercury HQ = 0.49), Step 3a-Background comparison (chromium, lead, manganese, vanadium, zinc)	Aroclor 1260
Trindle Spring Run	Nickel, acenaphthene, fluorene, arsenic, chromium, lead, silver	Step 2 - Food web modeling (nickel HQ = 0.18, acenaphthene HQ = 0.01, and fluorene HQ = 0.03), Step 3a-Background comparison (arsenic, chromium, lead, silver)	Aroclor 1260
Condoguinet Creek	Nickel	Step 2 - Food web modeling (nickel HQ = 0.21)	No COPCs retained